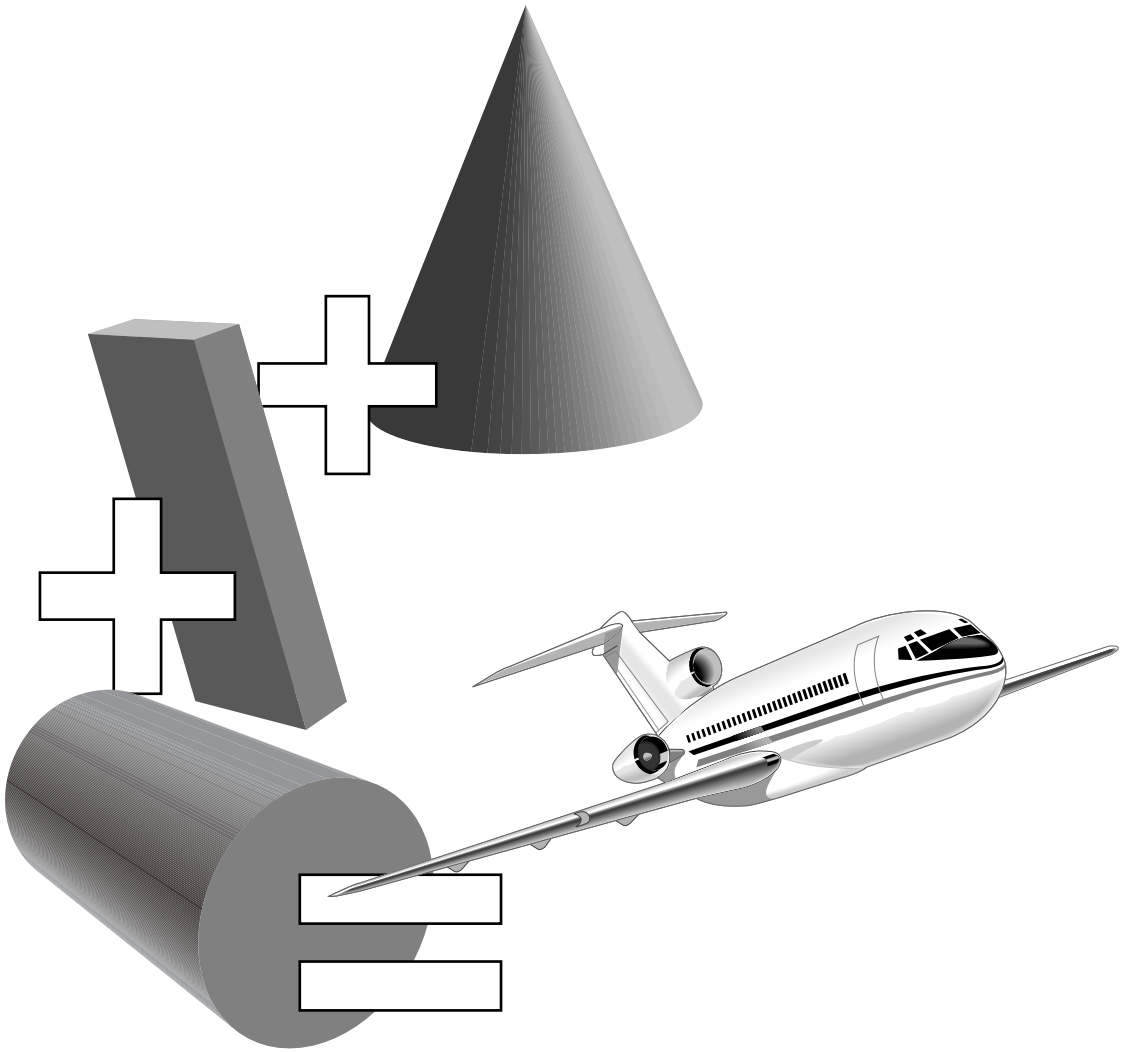
National Aeronautics and
Space Administration

Educational Product	
Teachers	Grades K-4

LaRC

ELECTRONIC LESSON:
THE SHAPE IS THE ANSWER

OEd



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National Aeronautics and
Space Administration
Langley Research Center
Hampton.VA 23681-0001

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NASA Langley's National Engineers Week project, now in its seventh year, is an example of the Center's commitment to mathematics and science education and to community outreach. We have a responsibility to encourage and help our young people prepare for life in a technological world and help develop the work force of the future. Providing positive role models is an effective way to capture the interest of students. One way we reach students is in the classroom, with personal visits from our staff. Of course, there are not enough of us to visit as many classrooms as we would like, so alternate methods of sharing the value of a mathematics and science education, as well as good communication skills, are also needed to help us reach as many students as possible.

"CONNECT" is one alternative mechanism for reaching out to the students, especially those we cannot visit personally during National Engineers Week. During the month of February, three 30-minute electronic lessons created by Langley will be distribute through WHRO-TV's ITFS wireless system to school cable networks. Each lesson will target a different group of grades (K-4, 5-8, and 9-12) and will address specific mathematics and science Virginia Standards of Learning (SOL).

The program, which launches Langley's Distance Learning Initiatives, shows the connection between mathematics and science skills taught in the classroom and their application in the workplace. In addition, the lessons show how science, mathematics, and engineering relate to the world around the students and why their studies are important. These lessons will be distributed to school systems on Wednesdays at 10:30 a.m., beginning February 12. The lessons will be rebroadcast on Fridays at the same time.

The Engineers Week program is the single largest outreach effort sponsored by NASA Langley. Last year, 170 employees participated reaching over 24,000 students and teachers within 12 school districts in the Tidewater area With the introduction of Langley's distance learning programming, and with the collaboration of WHRO, students and teachers from 19 school divisions in Southeastern Virginia and Northeastern North Carolina will be reached.

J F Creedon

Jeremiah F. Creedon
Director

LETTER
From NASA Langley's Director of Education

Project Direction

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WHRO-TV

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Pete Thomas
Gwen Wheatle

NASA Headquarters Aeronautics Program Office

NASA Headquarters Office of Human Resources & Education

Dear Educator:

As one of its four Strategic Outcomes, NASA has accepted the goal of promoting "the pursuit of educational excellence." NASA's vision for education is set forth in the 1996 NASA Strategic Plan:

> *To promote the pursuit of educational excellence by involving "the educational community in our endeavors to inspire America's students, create learning opportunities, and enlighten inquisitive minds."*

The program CONNECT marks the beginning of NASA Langley's distance learning initiatives. It is the goal of Langley's Office of Education to use distance learning media to communicate and disseminate to the educational community instructional programs and materials from NASA's mission to promote excellence in mathematics, science, and technology education.

I sincerely hope you and your students enjoy the video and activities included with each electronic lesson. I invite you to provide us with feedback about this program and any of our other educational products. Included in this guide is an evaluation form. Please take a moment to complete the form and return to us. We will gladly send you some of our outstanding materials, grade level appropriate, upon receipt of your evaluation form.

Sincerely,

Samuel E. Massenberg, Ed.D.
Director, Office of Education
NASA Langley Research Center

Lesson Title:
The Shape Is The Answer

Airs on WHRO ITFS, Channels 3, 25, 35
February 12, 1997, 10:30 a.m. to 11:00 a.m.
Rebroadcast of lesson on February 14, 10:30 a.m.

Subject Area Focus:
mathematics

Science Standards:
Science as Inquiry
Science and Technology
-abilities of technological design

Mathematics Standards:
Problem Solving
Reasoning
Connections
Geometry

Virginia Standards of Learning:
Geometry, Mathematics 2.18 and 3.18: The student will identify and describe a cube, rectangular solid, and cylinder, according to the number and shapes of faces, edges, bases, and corners.

Program Description:

Shapes fill the world around us. They are used in many different ways. This exciting program introduces and describes various shapes, including a cube, rectangular solid, and cylinder. The students are taken on a field trip to the lab of a test engineer to see how various shapes are used in real world applications. The program provides an opportunity for students to learn geometry while exploring the fascinating theme of aeronautics.

The lesson uses shapes to teach students about aeronautics, which is the study of how airplanes fly through the air. Aeronautics is one of four research enterprises which have been established by NASA to implement and communicate its mission to the public. Aeronautical research and technology play a vital role in our country today.

An important part of the lesson is the **Enterprise Challenge**. Students will have four minutes to complete the challenge. They will be shown photographs of modern aircraft and then asked to identify the kinds, numbers, and locations of shapes found on them. The challenge allows them to consider the vital role of shapes in constructing aircraft.

Before Watching

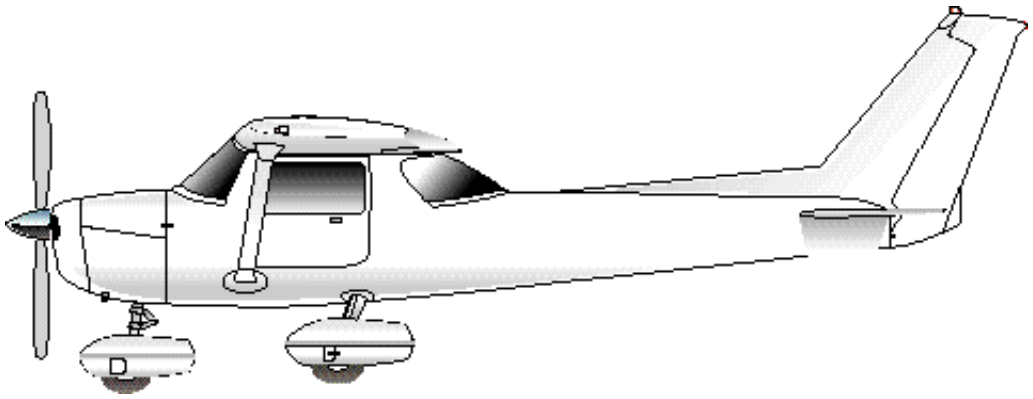
1. Have students identify different shapes found in the classroom.
2. Discuss the shapes in the classroom according to the number of faces, edges, bases, and corners.
3. Ask students to recall references to shapes in movies, television shows, books, poetry, and songs.

After Watching

1. Look for examples of other shapes on the airplanes that were not discussed during the lesson.
2. Determine how many different shapes make up large objects in the room (e.g., the teacher's desk).
3. Have students build the glider kits and review the shapes found on an airplane.

ENTERPRISE CHALLENGE

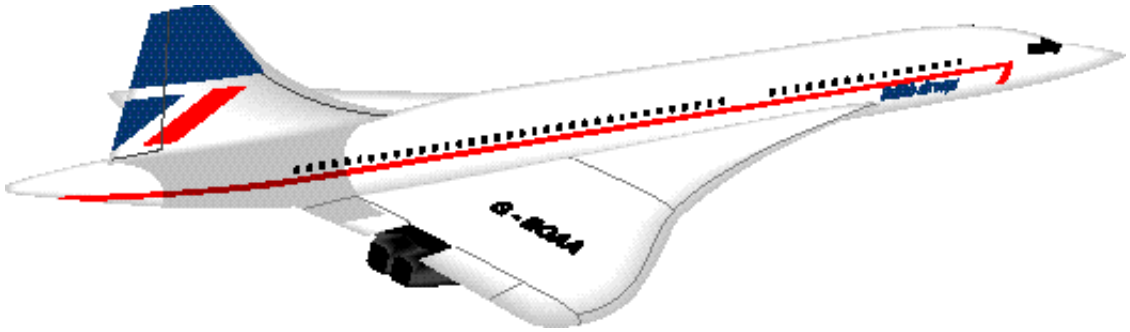
1. What shapes can you find?
2. How many of each shape can you find?
3. Where are they?



Cessna 150

ENTERPRISE CHALLENGE

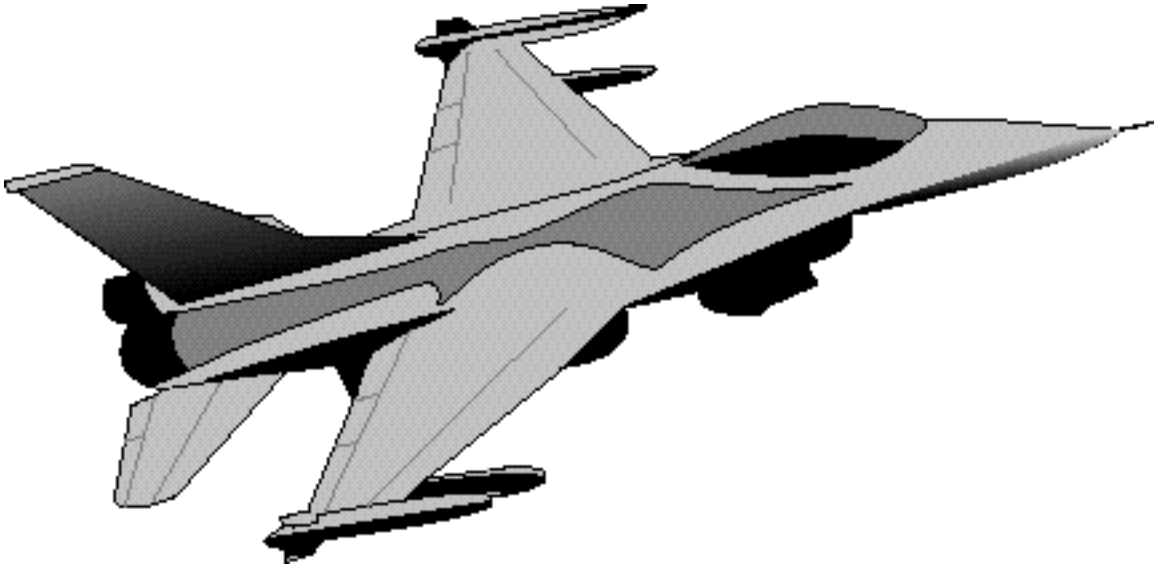
1. What shapes can you find?
2. How many of each shape can you find?
3. Where are they?



Concorde

ENTERPRISE CHALLENGE

1. What shapes can you find?
2. How many of each shape can you find?
3. Where are they?



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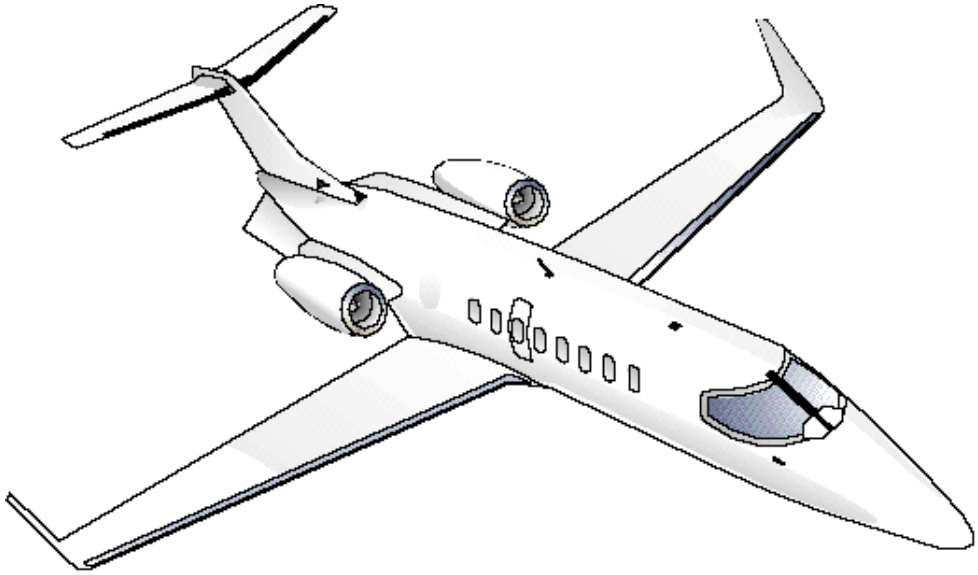
ENTERPRISE CHALLENGE

1. What shapes can you find?
2. How many of each shape can you find?
3. Where are they?



Learjet 45

Glider Kit

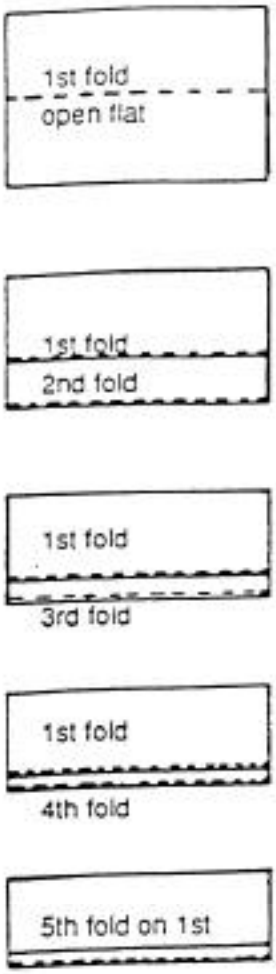
Spinner Glider

AERO DIGEST JULY 1932

This is a simple glider made from a single 8.5 by 11 inch sheet of paper. Start by folding the paper in half the long way, then what is left is half. Make four folds this way, then the fifth fold on the original fold.

Bend the trailing edge up slightly, then bend the center to give a "vee" shape, called **DIHEDRAL**, to the glider. (fig. 1) Dihedral usually gives **STABILITY** to an airplane, but when you fly this model, and it starts to turn, you will find out why it is called the **"SPINNER."**

Refold as shown in fig. 2 to have a stable glider.



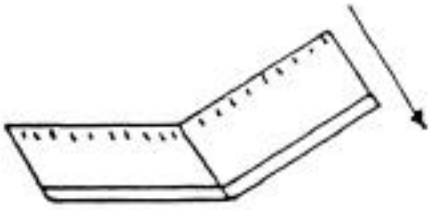


Fig. 1 unstable form

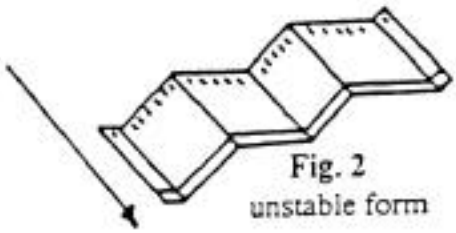


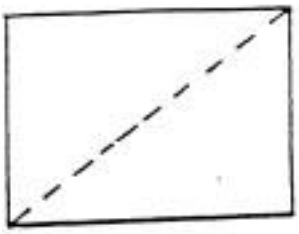
Fig. 2
unstable form

Glider Kit

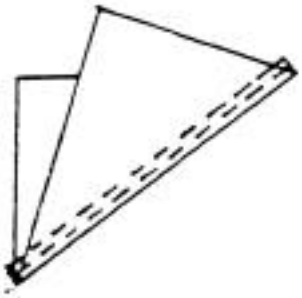
RING WING AIRCRAFT

Model made famous by George Allison
NASA Langley Research Center
developer unknown

1.



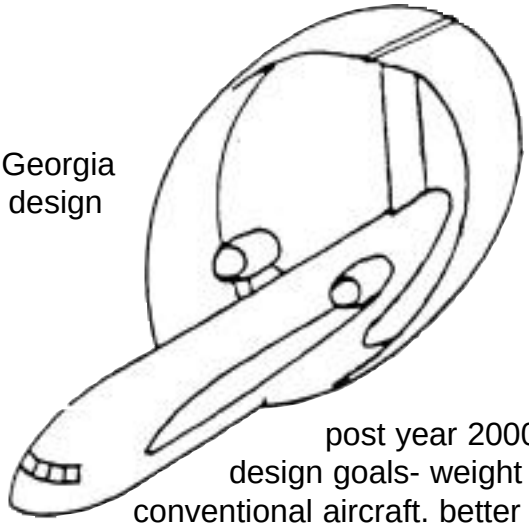
2.



3.

4.

NASA
Lockheed-Georgia
Ring Wing design



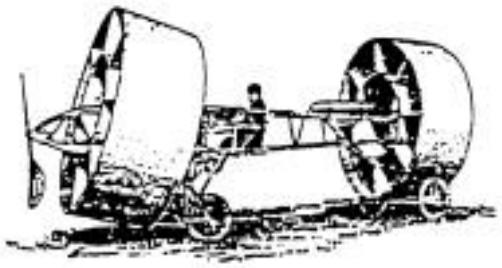
post year 2000 time frame
design goals- weight halt
conventional aircraft. better payload

Construction:

1. Fold typing or similar size/weight paper diagonally
2. Make two or more folds on front, each about one half inch wide.
3. With the fold on the inside, form the paper into a circle. Slip one pointy end into the other.

To fly the ring wing hold with two fingers on top of the "vee", the thumb on the bottom, and toss with a smo-o-o-th follow through. Too much speed or the lack of a follow through are "no-no's."

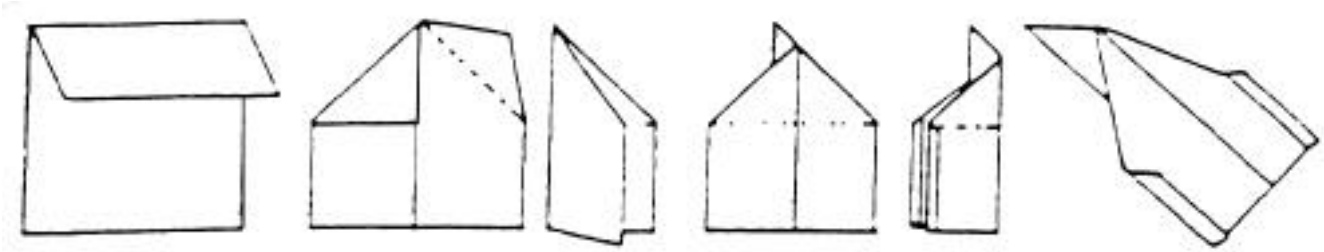
early French Ring
Wing design



Delta Glider Kit

How To Fold Your Delta Kite

1. Fold inward along line 1.
2. Fold top corners inward along lines 2 to meet at line 3.
3. Fold inward along line 3.
4. Fold wings out from fuselage along lines 4.
5. Fold wingtips up along lines 5.
6. Have a nice flight.



TEAR ALONG DOTTED LINE

THE DELTA STORY

Delta ranks among the top five U.S. airlines in size.

The Delta route system spans the United States and reaches to Canada, the Caribbean and across the Atlantic, serving 85 places in 32 states. Puerto Rico and five foreign nations. International destinations are Canada, Bermuda, the Bahamas, the United Kingdom and Federal Republic of Germany.

The Delta fleet of modern jets is comprised of the worlds most modern aircraft. A leader in the jet field throughout the years, Delta has a fleet consisting of the:

Lockheed L-1011-1 and Lockheed L-1011-500
Douglas Super DC8-61
Boeing 727
Douglas Super DC9
In 1982 Delta will add the new Boeing 767 and in 1984 the new Boeing 757

Delta operates over 1500 flights daily

Delta's 35,000 employees, each one a professional, are ready to provide Delta passengers the best in service, comfort, courtesy and efficiency. Delta professionals are people who know their jobs, enjoy people, and want to make friends for Delta Air Lines.

Delta is ready when you are.

NASA Educational Resources

The NASA Education Home Page is the entry point for a concise, user-friendly way to learn all about NASA's education programs, products, and services. The page contains:

- a "scrolling line" area for hot topics, application deadlines, and other announcements.
- a brief overview of NASA's Education Program.
- on-line access to current educational information and instructional resource materials.
- information about programs and curriculum support products including a searchable inventory of programs and how to access instructional resource materials and services.
- education points of contact for NASA Headquarters as well as NASA Field Centers.

World Wide Web:

http://www.hq.nasa. gov/office/codef/education/

NASA Educational Satellite Videoconference Series is offered as an inservice education program for educators through the school year. The content of each program varies, but includes aeronautics or space science topics of interest to elementary and secondary teachers. NASA program managers, scientists, astronauts, and education specialists are featured presenters. The videoconference series is free to registered educational institutions. To participate, the institution must have a C-band satellite receiving system, teacher release time, and an optional long distance telephone line for interaction. Arrangements may also be made to receive the satellite signal through the local cable television system. The programs may be videotaped and copied for later use.

For more information, contact:
Videoconference Producer
NASA Teaching From Space Program
308 A CITD
Oklahoma State University
Stillwater, OK 74078-0422
or send an electronic message (e-mail) to:
nasaedutv@smtpgate.osu.hq.nasa.gov

NASA Television features programming that has three program blocks: Education File, History File, and News Video File--repeated at intervals 24 hours a day. Programs feature:

- Space Shuttle mission coverage
- Live special events
- Interactive education videoconferences
- Electronic field trips
- Aviation and space news
- Historical NASA footage

The Education File features programming for teachers and students on science, mathematics, and technology. You and your class can investigate exciting NASA research endeavors in aeronautics, microgravity, planetary sciences, human exploration of space Earth systems, robotics, and more. Educators are welcome to videotape NASA TV. The scheduled times for the Education File are: 2-3 p.m., 5-6 p.m., 8-9 p.m., 11 p.m.-12 a.m., and 2-3 a.m. (EST). For more information, contact:

NASA TV, NASA Headquarters, Code P-2
Washington, DC 20546
Phone (202)358-3572

NASA TV: Spacenet-2, C-Band, T5, Ch. 9, 69 degrees West, 3880 MHz, horizontal polarization, audio 6.8 MHz

NASA Educator Resource Center Network

To make additional information available to the educational community, the NASA Education Division has created the **NASA Educator Resource Center (ERC) Network**. ERCs contain a wealth of information for educators: publications, reference books, slide sets, audio cassettes, videotapes, telelecture programs, computer programs, curriculum support materials, and educator guides with activities. Because each NASA Field Center has its own areas of expertise, no two ERCs are exactly alike. Telephone calls are welcome if you are unable to visit the ERC that serves your geographic area. A list of the Centers and the geographic regions they serve are listed in the following paragraphs:

Regional Educator Resource Centers (RERCs) offer more educators access to NASA educational materials. NASA has formed partnerships with universities, museums, and other educational institutions to establish RERCs in many states. Educators may preview, copy, or receive NASA materials at these sites. A complete list of RERCs is available through the ERCs or CORE.

NASA Central Operation of Resource for Educators (CORE) was established for the national and international distribution of NASA-produced educational materials in audiovisual format. Educators can obtain a catalogue of these materials and an order form by written request, on school letterhead, to:

NASA CORE
Lorain County Joint Vocational School
15181 Route 58 South
Oberlin, OH 44074
Phone: (216) 774-1051, Ext. 293 or 294

WEB SITE:

Web site for NASA ERCN is:
http://www.teacherlink.usu.edu/nasa/accessnasa/TRCN.html

IF YOU LIVE IN:

Alaska	Nevada
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NASA Ames Research Center
Moffett Field, CA 94035-1000
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NASA Educator Resource Center Network

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South Dakota
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NASA Educator Resource Center Network

(Continued)

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Michigan	Wisconsin

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Iowa	Tennessee

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NASA Educator Resource Center
U.S. Space and Rocket Center
P.O. Box 070015
Huntsville, AL 35812-0001
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Mississippi

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Building 1200
NASA John C. Stennis Space Center
Stennis Space Center, MS 39529-6000
Phone: (601) 688-3338

Internet:
The following listing of Internet addresses will provide users with links to the NASA Aeronautics Center Education Home Pages:

http://www.hq.nasa.gov/office/codef/education

http://ccf.arc.nasa.gov/dx

http://www.drfc.nasa.gov.gov/Education/aeronautics.html

http://edu-www.larc.nasa.gov/edu/OED.html

http://www.lerc.nasa.gov/Other_Groups/PAO/html/educatn.html

Agency K-12 Internet Outreach Web Sites:

http://quest.arc.nasa.gov

http://observe.ivv.nasa.gov

http://observe.ivv.nasa.gov/observe/exhibit/planes/planes.html